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Taking into account physical and instrumental parameters in atomic absorption spectroscopy with a continuous radiation source

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Abstract

We present a detailed analysis of the dependences of the absorption contours and concentration curves on various parameters in atomic absorption spectrometry with a continuous radiation source. We have developed a multifunctional application software package allowing us to calculate the emission and absorption line profiles for different elements under different physical conditions. We take into account Doppler and collisional broadening of the absorption lines, which have a complex structure as a result of the isotopic shift, hyperfine splitting of the components, and also instrumental distortion of these lines. We consider two different procedures for calculating the absorbance and do a comparative analysis of the two procedures. For all the listed cases, we can plot concentration curves and find the absorbance within the classical definition and plot the concentration curve using only a portion of the spectral width of the profile rather than the entire width. We have modeled the instrumental distortions of the spectral profile due to spectral selection, and we have analyzed their effect on the shape of the absorption contour.

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Keywords

Absorbance, Atomic absorption spectrometry with continuous radiation source, Concentration curve, Modeling instrumental distortions, Spectral absorption profile